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SUBJECT     Effect of Carbon Content on High Temperature  
Strength of 14% Cr, 14% Ni; 2.5% W Steel

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entitled "Effect of Carbon Content on High Temperature Strength of 14% Cr, 14% Ni, 2.5% W Steel" by A Borzdika and K Lanskaya which appeared in "Metallurg", Vol 15, 1940 #10, pages 25-31. The article discusses the following subjects:

- a) Investigation of 14% Cr, 14% Ni, 2.5% W steel having carbon contents of .45, .22 and .13%.
- b) Melting of experimental steels and preparation of specimens.
- c) Metallographic study.
- d) Effect of temperature and duration of aging upon hardness and notch toughness.
- e) Brittleness and stability of structure at elevated temperatures. Mechanical properties at ordinary and high temperatures. Creep behavior.
- f) Advantages of 14-14 steel with .1-.2% C over 14-14 steel with .45% C for applications requiring high ductility, such as drawn tubes.

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CLASSIFICATION CONFIDENTIAL

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A. Borzdika and K. Lanskaya:

EFFECT OF CARBON CONTENT ON HIGH TEMPERATURE STRENGTH OF 14% CHROMIUM 14% NICKEL STEEL.

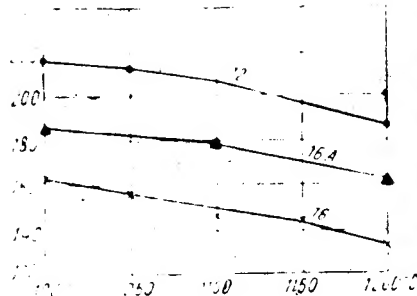


Fig. 1- Effect of quenching temperature upon hardness.



Fig. 2- Steel 16 A with .22% C; quenched from 1100° C (2010° F); 500X.



Fig. 3- Steel 16 with .13% C; quenched from 1100° C (2010° F); 500X.

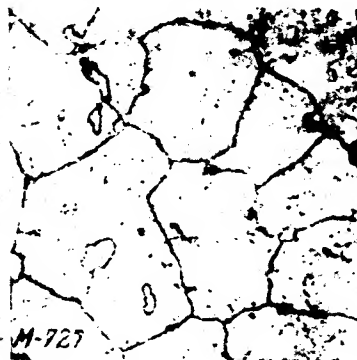


Fig. 4- Steel 12 with .45% C; quenched from 1200° C (2190° F); 500X.

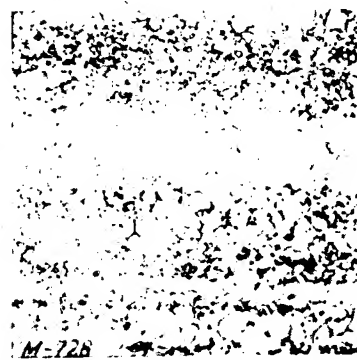


Fig. 5- Steel 12 with .45% C; as rolled; longitudinal section; 100X.

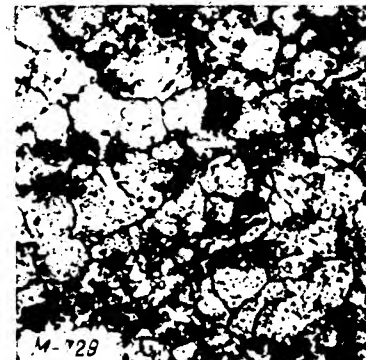


Fig. 6- Steel 12; aged for 100 hours at 600° C (1110° F); 500X.

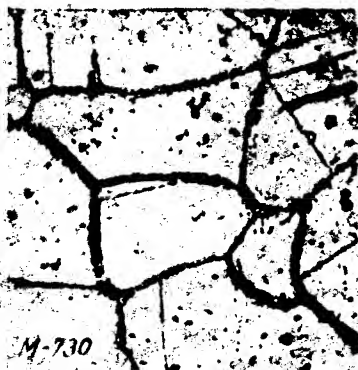


Fig. 7- Steel 16; aged for 100 hours at 600° C (1110° F); 500X.

Tensile Strength & Yield Point  
Point, kg/mm<sup>2</sup>; Elongation  
and Reduction, %

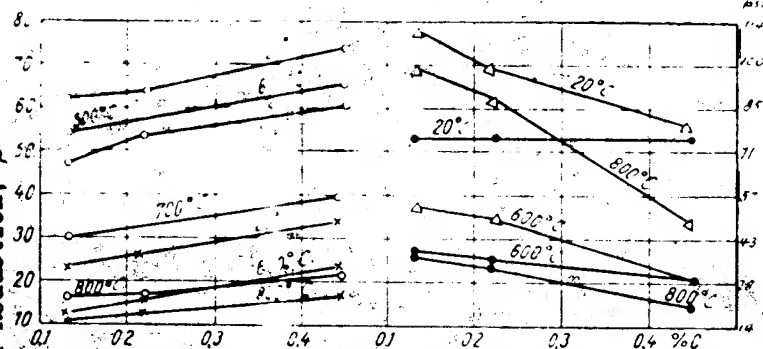


Fig. 8- Effect of carbon content in 14-14 steel on mechanical properties at different temperatures.

• Tensile strength; \* yield point; • elongation Δ reduction

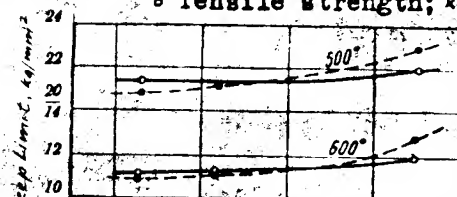


Fig. 9- Influence of carbon content in 14-14 steel upon creep limit. Solid lines: tension; broken lines: torsion.

**EFFECT OF CARBON CONTENT ON HIGH TEMPERATURE STRENGTH**

**OF 14% Cr, 14% Ni, 2.5% W STEEL**

**By A. Borzdika and K. Lanskaya**

**[Translated from METALLURG, vol. 15, # 10, pp. 25-31]**

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**S y n o p s i s:**

Investigation of 14% Cr, 14% Ni, 2.5% W steel having carbon contents of .45, .22, and .13%.

Melting of experimental steels, and preparation of specimens.

Metallographic study.

Effect of temperature and duration of aging upon hardness and notch toughness.

Brittleness and stability of structure at elevated temperatures. Mechanical properties at ordinary and high temperatures. Creep behavior.

Advantages of 14-14 steel with .1-.2% C over 14-14 steel with .45% C for applications requiring high ductility, such as drawn tubes.

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Among the high alloy steels which in recent years have found wide application as high temperature strength materials, the austenitic 14% Cr, 14% Ni steel may be mentioned which was first brought out by Fried. Krupp A.G. in 1932.

In this country, 14-14 steel is being made in two modifications: (1) with a silicon content of from .3 to .8% and with a small addition of molybdenum, of the order of .5% (Elektrostal Type EI 69) and (b) with the silicon content increased to 1.8%, but without molybdenum (Leningrad Type CXHB), a composition corresponding to the original WF 100 steel.

Owing to its high mechanical properties at increased temperatures, this steel has found ready acceptance especially for valves of large internal combustion engines and for steam turbine blades. In the cold state, 14-14 steel is characterized by its high mechanical strength coupled with still greater ductility; when taking into account all of the mechanical properties, this steel is in no way inferior to the best types of high-alloy austenitic steels<sup>(1,2,3)</sup>

It is an unfortunate fact that the ductile properties of 14-14 steel deteriorate appreciably at temperatures from 700 to 900° C (1290-1650° F), with the elongation decreasing to 12% and the reduction of area, to 20-22%. Another drawback of this steel, if its carbon content is in the neighborhood of .5% consists in its propensity to carbide segregation.

The present study was undertaken to throw light on the possibility of decreasing the carbon content in the two

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Russian variants of this steel in order to improve the plasticity in the hot state, while retaining the other mechanical properties more or less unimpaired.

### 1- Steels Studied.

The experimental steels were melted at the Elektro-stal works. The steel with the conventional composition (No. 12 in Table 1) was made in a basic-lined 3-ton Heroult furnace while the steels with decreased carbon contents (No. 16-A and 16) were melted in a laboratory high frequency furnace.

Table 1- Chemical Composition, Grain Growth Range and Quenching Temperature of Steels Studied.

	12	16-A	16
Carbon .....	.45	.22	.13
Silicon .....	.69	.71	.67
Manganese .....	.47	.60	.60
Chromium .....	13.80	14.50	14.50
Nickel .....	14.50	14.50	14.00
Tungsten .....	2.25	2.35	2.40
Molybdenum .....	.54	.46	.45
Grain growth takes place between	1150 and	1100 and	1050 and
Quenching (with 30 min. holding) at	1200°C	1150°C	1100°C
	1100°C	1100°C	1050°C
	water	air	air

Preparatory to forging into square sections, 40 mm (1.6 inch) in size, the 50-kg (110-lb) ingots were heated for four hours at 700-750° C (1290-1380° F) and held for one hour in a chamber having a temperature of 1160-1170° C (2120-2140° F); this was done in consideration of the high alloy content and the low thermal conductivity of the steels. The ingots which were soft and ductile, lent themselves well

to forging and did not develop any cracks; the final forging temperature was not lower than 850° C (1560° F). After the forging, the steel was rolled to rounds, 20 mm (.787") in diam. and subjected to a preliminary heat treatment consisting of heating to 850° C (1560° F), holding for one hour; heating to 1180° C (2155° F) and holding for 45 minutes. The finished rounds were then cooled while piled up in stacks.

## 2- Thermal-Metallographic Study.

In any consideration of the influence of carbon upon the microstructure of 14-14 steel, it is necessary to enlarge on two different aspects:

(1) Carbon exerts a beneficial influence as a stabilizer of the austenite: There is no  $\alpha$ -phase which would increase the number of phases of the system thus lowering the chemical stability and mechanical strength of the steel at elevated temperatures. The single-phase character of Cr-Ni steels with relatively low nickel contents can be attained by the incorporation of a sufficient quantity of carbon into the steel. Thus, for instance, in 18-8 steel containing .5% C an austenitic structure may be obtained at 20° C (68° F) while in the carbon-free alloy, at room temperature, the two-phase structure  $\alpha + \gamma$ -iron is stable.

(2) An increased carbon content in steels of this type destined for service at elevated temperature is undesirable as under the conditions of temperature in question, it can be expected that carbides will precipitate along the grain junctions; in other words, the carbon destroys the stability of the austenite.<sup>(3,4)</sup>

The changes in the structure of the steels under investigation, when quenched from 1000 to 1300° C (1830-2370° F) proceed in two directions: (a) There is a growth

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of the austenite grain<sup>(5)</sup> and (2) a solution of the carbides in the austenite.

The dissolution of the carbide leads to a gradual decrease of the hardness as the quenching temperature is increased (Fig. 1). Steel 16 with .13% C shows the lowest hardness at all temperatures of quenching.

Below 1000° C (1830° F), no changes whatever (neither a solution of carbide nor a growth of the grain) occur in any of the three steels.

At 1100° C (2010° F), part of the carbide undergoes dissolution; the grain size, when compared with the specimens quenched from 1000° C (1830° F) changes very little in Steels 12 and 16-A (Fig. 2). In the micro of Steel 16 quenched from 1100° C, an abrupt growth of the grain (Fig. 3) is evident which indicates that the critical coarsening temperature is within the interval of 1050-1100° C (1920-2010° F).

Upon heating to 1150° C (2100° F), the austenite grains increase appreciably also in the two other steels; in Steel 16, however, their size is considerably larger. In Steels 12 and 16-A, the quantity of carbide is very much reduced & whatever carbide has remained undissolved, coagulates.

At a temperature of 1200° C (2190° F), almost all of the carbide has dissolved in Steel 16-A, while in Steel 12, coagulated carbide still can be found (Fig. 4).

Thus, the temperature of rapid grain growth is different for each steel, being a function of the carbon content (see Table 1 on page 3).



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Steel 12 contains the largest quantity of carbide and has a considerably finer grain at elevated temperatures; this can be explained by the fact that the carbide impedes the growth of the grain during heating. The amount of carbide in the melts with .22% C and especially, .13% C, of course, is smaller and the grain is larger.

On the basis of the results of a microexamination, the heat treatments indicated in Table 2, have been selected.

Table 2- Influence of Temperature and Duration of Aging upon Hardness ( $H_B$ ) and Notch Toughness ( $a_k$ ) of Steels under Investigation.

Holding Time Hours	Steel 12			Steel 16-A			Steel 16		
	$H_B$	$\frac{mkg}{cm^2}$	$\frac{ft-lb}{in^2}$	$H_B$	$\frac{mkg}{cm^2}$	$\frac{ft-lb}{in^2}$	$H_B$	$\frac{mkg}{cm^2}$	$\frac{ft-lb}{in^2}$
As-quenched	207	9	420	163	min.19	> 885	137	min.19	min.885
Aging at 650° C (1200° F)									
100	207	6.6	307	207	11.8	550	153	14.8	690
250	207	6.8	317	257	11.8	550	156	12.4	578
500	207	6.9	321	207	12.3	573	156	14.2	662
1000	207	6.7	312	197	11.6	541	156	13.6	634
Aging at 600° C (1110° F)									
100	207	6.7	312	156	min.19	885	143	min.19	min.885
250	217	7.8	363	207	13.3	620	147	min.19	min.885
500	207	6.4	298	217	9.5	443	156	17.3	806
1000	207	6.6	307	213	9.1	424	156	17.5	815
Aging at 500° C (930° F)									
100	207	7.3	340	156	min.19	885	131	min.19	min.885
250	215	7.0	326	156	min.19	885	134	min.19	
500	207	6.2	289	163	17.3	806	143	min.19	
1000	217	6.7	312	163	17.5	815	156	min.19	

(1) 10x10 mm (.39x.39") specimens with Mesnager notch; The value of min. 19 mkg/cm<sup>2</sup> means that the specimen did not break under the 15 mkg hammer. The notch toughness in the initial state is assumed to be 20 mkg/cm<sup>2</sup> (930 ft.lb/in<sup>2</sup>)

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When subjecting longitudinal polished sections of Steel 12 to microexamination in their initial state, a marked axial carbide segregation could be observed (Fig. 5). Upon quenching from 1200° C (2190° F), the carbide strings did not disappear entirely; the carbide, however, coagulated.

In Steel 16-A, also, axial carbide segregation was found, although to a much smaller extent. There was no such segregation in Steel 16. In Steels 12 and 16-A, however, it may exert an adverse effect on the ductility.

### 3- Brittleness and Structural Stability at Increased Temperatures.

By brittleness at increased temperature, the loss in notch toughness is meant that is suffered by steel after more or less prolonged exposure to heat. The brittleness of austenitic steel at high temperature is ordinarily explained by the precipitation of carbide along the austenite grain junctions.<sup>(6)</sup> The stability of the structure and the brittleness at increased temperature of the steels under investigation were studied by prolonged heating for 100, 250, 500, and 1000 hours at 500, 600, and 650° C (930, 1110, and 1200° F).

The changes in structure that occur in a 14-14 steel in aging are two-fold: (1) Carbide is precipitated along the junctions and inside of the grain, and (2) The carbides coagulate as the holding time is extended.

Prolonged holding (500-1000 hours with Steel 12) at 600-650° C (1110-1200° F), evidently, facilitates the

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coagulation of the carbide although coagulation is known to occur with short holdings within the range of 800-900° C (1470-1650° F). An inspection of the microstructure of Fig. 6 makes it clear that in Steel 12 a partial coagulation of the carbide takes place as early as after a 100 hour holding at 600° C (1110° F); next to coarse carbides, there are found many fine ones. A maximum coagulation of the carbide is obtained by holding for 500 and 1000 hours (at 500, 600, and 650° C).

At the temperature of 600° C (1110° F), a maximum carbide precipitation takes place. At this temperature, the hardness is highest (Table 2, page 6).

As may be seen from Fig. 7, finely dispersed carbides precipitate out in Steels 16 and 16-A. Steel 12 (when quenched from 1100° C or 2010° F) shows a maximum hardness which remains almost unchanged with varying temperatures and times of holding. In Steel 16-A, also, the hardness increases little after aging at 500° C (930° F) probably because at 500° C, there is no carbide precipitation as yet. The greatest increase in hardness with Steel 16 is observed after aging at 600° C (1110° F) which tallies with the notch toughness test data (Table 2). As the temperature and duration of holding are increased for Steel 16, there is a small increase in hardness.

The results of the notch toughness tests are shown in Table 2 (page 6). Steel 16 gives a minimum notch toughness of 12.4 mkg/cm<sup>3/2</sup> (578 ft-lb/in<sup>3/2</sup>); this value is obtained

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with a holding time of 250 hours at a temperature of 650° C (1200° F). The greatest drop of the initial hardness with Steel 16-A, i.e. 38%, is found at 650° C (1200° F). Steel 12 possesses the lowest values of notch toughness of all the three steels; after an initial small decrease, the notch toughness of this steel shows practically no change with the different temperatures and times of holding (variation from 6.2 to 7.3 mkg/cm<sup>2</sup> or 288-340 ft-lb/in<sup>2</sup>).

#### 4- Mechanical Properties and High Temperature Strength.

The mechanical properties and the high temperature strength of the steels in question were determined after quenches as given in Table 1 (page 3). The tensile tests were made on Gagarin presses at 20, 600, 700, & 800° C (68, 1110, 1290, 1470° F) on specimens 8 mm (.236") in diameter and 60 mm (2.36") in length. The fluctuations of the temperature during testing did not exceed  $\pm 5^{\circ}$  C (9.0° F). The specimens were heated in an electric resistance furnace with a Nichrome coil.

It was found that yield point, tensile strength, elongation and reduction values become smaller as the temperature is raised; this applies to all three steels (Fig. 8). Tensile strength and yield point show an especially pronounced drop at 800° C (1470° F) as the temperature of recrystallization of austenitic alloy steels is between 600 and 900° C (1470 and 1650° F).

The ductility (elongation and reduction of area) values fall off with increasing temperature because of the precipitation

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of (structurally) free carbide from the  $\gamma$ -solution; for Steel 2169 of standard analysis<sup>(3)</sup> this occurs as early as at 600° C (1110° F). The further decrease of the elongation is slower; with Steel 16, it is practically stopped. This indicates that the main portion of the carbides actually precipitates from the solid solution at 600-700° C (1110-1290° F).

The decrease of the carbon content of the steels at all of the temperatures studied results in a drop of the values of tensile strength and yield point and a pronounced increase of the ductility (Table 3).

When studying the test data, it may be seen that Steels 16 and 16-A are very much alike, especially in regard to the mechanical strength at 800° C (1470° F) and the ductile properties at 600° C (1110° F).

Table 3- Decrease in Mechanical Strength and Increase in Ductility as Function of Drop of Carbon Content of 14-14 Steel from .45 to .13% C, in %.

Temperature °C      °F		Tensile Strength	Yield Point	Elonga- tion +	Reduction of Area +
20	68	16	31	0	28
600	1110	23	44	26	43
800	1470	27	33	45	50

### 5- Creep Behavior.

The creep tests were carried out in the form of torsion and tensile tests at 500° C under a load of 20-25 kg/mm<sup>2</sup> (28400-35600 psi) and at 600° C (1110° F) under a load of 10-18 kg/mm<sup>2</sup> (14200-25600 psi). Before being tested, the

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specimens were heat treated (see Table 1, page 3) in order to remove the hardness left from cold working; after that, they were brought to final dimensions.

The duration of the torsion tests, which were preliminary in character, was 48 hours; the tension tests lasted 1000 hours. As basic criterion for the comparative evaluation of the creep resistance, a rate of creep of  $10^{-6}$  mm/mm or  $10^{-4}\%$  per hour was used. The "creep limits" thus found for the steels studied have been plotted in Fig. 9.

At a temperature of  $500^{\circ}\text{C}$  ( $930^{\circ}\text{F}$ ), the greatest resistance to creep ( $22\text{--}23\text{ kg/mm}^2$  or  $31300\text{--}32700\text{ psi}$ ) is shown by Steel 12. Steels 16 and 16-A have a slightly higher creep (creep limit of about  $21\text{ kg/mm}^2$  or  $29900\text{ psi}$ ); as may be seen from Fig. 9, however, the difference is small.

At  $600^{\circ}\text{C}$  ( $1110^{\circ}\text{F}$ ), the highest resistance to creep, again, is found in Steel 12 which has a creep limit, with tension, of about  $12\text{ kg/mm}^2$  ( $17100\text{ psi}$ ) and with torsion, of about  $13\text{ kg/mm}^2$  ( $18500\text{ psi}$ ). Steel 16-A was tested only by the torsion method under a load of  $11\text{ kg/mm}^2$  ( $15600\text{ psi}$ ) which was almost sufficient to give a rate of creep of  $10^{-6}$  mm/mm per hour between the 24th and 48th hour. Steel 16 has a creep limit of  $11\text{ kg/mm}^2$  ( $15600\text{ psi}$ ) according to both methods.

In this manner, the torsion test data permit of drawing the conclusion that a decrease of the carbon content in 14-14 steel to  $.13\%$  C lowers its resistance to creep at  $500^{\circ}\text{C}$  on the whole by  $10\%$ , and at  $600^{\circ}\text{C}$  ( $1110^{\circ}\text{F}$ ), by  $15\%$ .

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According to the test data on creep by tension, the steel with .45% C closely approaches the steels with .22 and .13% C.

### 6- Conclusion.

Cr-W-Ni steel of the 14-14 type with .15% C has high temperature strength values which are somewhat inferior to those of 14-14 steel with .45% C as may be seen clearly from the results of short-time tensile tests and less clearly from the creep test data.

In regard to the ductility, structural stability and resistance to embrittlement at increased temperature, this steel is better than the steel with .45% C. The same is true in regard to carbide segregation.

In view of the technological difficulties obstructing the melting of a steel with 0.1% C, 14-14 steel with about 0.2% C is acceptable; such a steel, furthermore, would possess considerable ductility and sufficient structural stability, although this stability is somewhat lower than in steel with .1% C. In regard to high temperature strength, this steel is superior to the steel with .1% and does not differ greatly from 14-14 steel with .45% C.

From what has been said before, the conclusion may be drawn that 14-14 steel with .10-.20% C offers a substitute for 14-14 steel with .45% C for a variety of articles which require high ductility at temperatures up to 800-850° C (1470-1560° F) and are expected to carry appreciable loads.



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More specifically, the high degree of ductility of 14-14 steel with .1-.2% C in the hot and cold state makes possible its use for all-drawn steel tubing of considerable high temperature strength such as has not been produced as yet in this country. Trials made at the Liebknecht tube mills at Dnepro-Petrovsk point in this direction.

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R e f e r e n c e s:

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-



von Worten, Ausdruecken und Abkuerzungen aus der  
sowjetischen Wirtschaft.

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<u>ASSR</u> abbr. Avtonomnaya Sovetskaya Sotsialisticheskaya Respublika	Autonome Sozialistische Sowjet-Republik
<u>Avtobaza</u>	Kraftfahrzeugbasis (Staedtische oder bezirkliche Stelle fuer die Verwaltung u. Zuteilung von Kraftfahrzeugen)
<u>DOK</u> abbr. Derevo-obdelochnyy Kombinat	Holzverarbeitungskombinat
<u>Domenny Tsekh</u>	Hochofenabteilung (Kriegsgefangenenbezeichnung "Domino")
<u>Domna</u>	Hochofen (Kriegsgefangenenbezeichnung "Dom", "Doma")
<u>Ferrosplavnyy Zavod</u>	Eisenlegierungswerk
<u>Gasoprovod</u>	Gasleitung
<u>GES</u> (abbr. Gosudarstvennaya Elektricheskaya Stantsiya)	Staatliches Kraftwerk, Kraftwerk
<u>Gidro</u>	in Zusammensetzungen: Wasser
<u>Gidromontazh</u>	Werk fuer Wasserbauten
<u>Glav</u>	in Zusammensetzungen: Hauptverwaltung
<u>Glavmet</u> abbr. Glavnoye Metallurgicheskoye Upravleniye	Hauptverwaltung Metallurgie
<u>Glavsevmorput</u> abbr. Glavnoye Upravleniye Severnogo Morskogo Puti	Hauptverwaltung des Noerdlichen Seeweges
<u>Gorkom</u> abbr. Gorodskoy Komitet	Stadtkomitee ( der kommunistischen Partei)
<u>Gorsovet</u> abbr. Gorodskoy Sovet	Stadtsowjet
<u>GPU</u> abbr. Gosudarstvennoye Politicheskoye Upravleniye	Staatliche Politische Verwaltung, Politische Polizei. Heute: MVD
<u>GRES</u> abbr. Gosudarstvennaya Rayonnaya Elektricheskaya Stantsiya	Staatliches Bezirkskraftwerk
<u>Imeni</u>	namens, zu Ehren. In Verbindung mit Fabrikbezeichnungen, z.B. Zavod imeni Lenina (Leninwerk)
<u>Kav</u> abbr. Kavkazskiy	Kaukasisch, Kaukasus- in zusammengesetzten Worten, z.B. Kavtsink (Kaukasuszinkwerk)
<u>Kaz</u> abbr. Kazakhstenskiy	Kasakhisch, Kasachstan- in zusammengesetzten Worten, z.B. Kazzoloto (Trust "Kazakhstan-Gold")

Wörter, Ausdrücke und Abkürzungen  
 aus dem russischen Wortschatz  
 des sowjetischen Wortschatzes

I.

<u>Khim</u> abbr. Khimicheskii	Chemisch, Chemie- in zusammen- gesetzten Worten, z.B. Khimzavod (Chemisches Werk)
<u>Kolkhoz</u> abbr. Kollektivnoye Khoz- yaystvo)	Kollektivwirtschaft, gemeinsam bewirtschafteter landwirtschaft- licher Betrieb.
<u>Komsomol</u> abbr. Kommunisticheskii Soyuz Molodezhi	Kommunistischer Jugendbund
<u>Komsomolets</u>	Jungkommunist. Das Wort wird auch als Name fuer Fabriken ver- wendet.
<u>Kombinat</u>	Kombinat, Vereinigung verschie- dener miteinander verbundener Werke zu einem Grossbetrieb.
<u>Kozhzavod</u> abbr. Kozhevennyy Zavod	Lederfabrik
<u>Krasnyy Oktyabr</u>	Roter Oktober (Jahresmonat der bolschewistischen Revolution). Haeufiger Name von Fabriken.
<u>Kray</u>	Gau, Gebiet (Sowjetischer Ver- waltungsbezirk, z.B. Krasnodarskiy Kray - Gau Krasnodar)
<u>Kuzbass</u> abbr. Kuznetskiy Kamennou- gol'nyy Basseyn	Kuznetsker Steinkohlenbecken <i>[The Kuznetsk Basin includes the whole industrial area, and not just the coal industry there]</i>
<u>Kreking zavod</u>	Krackanlage, Oelraffinerie
<u>Magistral'</u>	Hauptverkehrsline, Hauptbahn, Hauptverkehrsstrasse, Hauptleitung
<u>Mazut</u>	Masut, Heizool, Erdoelruck- stand
<u>Met Zavod</u> abbr. Metallurgicheskii Zavod	Metallurgisches Werk, Eisen- huettenwerk
<u>MRZ</u> abbr. Motoro-remontnyy zavod	Motorenreparaturwerk
<u>MTS</u> abbr. Mashinno-Traktornaya Stantsiya	Maschinen- und Traktorenstation
<u>MVD</u> abbr. Ministerstvo Vnutrennikh Del.	Ministerium fuer innere Ange- legenheiten. Abkuerzung fuer: Politische Polizei
<u>Myssokombinat</u>	Fleischkombinat (Grossbetrieb fue Gewinnung von tierischen Pro- dukten)
<u>Naftobaza</u>	Treibstofflager, Tankstelle
<u>Naftoprovod</u>	Erdoelleitung
<u>Nizhniy, Nizhna-</u>	Unterer, Unter- (wird haeufig in Verbindung mit Orts- und Flussna- men angewandt).
<u>NKVD</u> abbr. Narodnyy Komissariat	Volkskommissariat fuer innere An- gelegenheiten. Frueher: Bezeich- nung fuer Politische Polizei.

<u>Novyy, Novo-</u>	neu, Neu-. (wird häufig in Verbindung mit Ortsnamen angewandt)
<u>Obl</u> abbr. Oblast'	Oblast, Gebiet (Sowjetischer Verwaltungsbezirk von der Grösse einer Provinz).
<u>Partkom</u> abbr. Partinyy Komitet	Parteikomitee
<u>Polimetally</u>	Polymetalle, Mehrmetalle (Blei, Zink)
<u>Poselok</u>	Siedlung, z.B. Rabochiy Poselok, Arbeitersiedlung
<u>Profsoyuz</u> abbr. Professional'nyy Soyuz	Gewerkschaft, Gewerkschaftsbund
<u>Plotina</u>	Staudamm, Talsperre (bei Kraftwerken)
<u>Prokatnyy</u>	Walz, z.B. Prokatnyy Tsekh, Walzabteilung eines Werkes (Kriegsgefangenenbezeichnung "Prokat")
<u>Pristan'</u>	Landungsplatz, Schiffsanlegestelle (an einem Fluss)
<u>Prom</u> abbr. Pronyshlennost' promyshlennyy	Industrie, industriell. Häufig in Zusammensetzungen, z.B. Promtevar, Industrieware
<u>Promstroy</u> abbr. Promyshlennoye Stroitel'stvo	Industrielles Bauvorhaben
<u>Redmet</u> abbr. Redkiye Metally	Seltene Metalle (z.B. Gold, Platin, Wolfram)
<u>Rayon</u>	Rayon, Bezirk (Sowjetischer Verwaltungsbezirk: Ein Oblast zerfällt in eine Anzahl Rayons).
<u>RSFSR</u> abbr. Rossiyskaya Sovetskaya Federativnaya Sotsialisticheskaya Respublika	Russische Sozialistische Föderative Sowjetrepublik
<u>Remontnyy, Remontno-</u>	Reparatur-. In Zusammensetzungen, z.B. Avtoremontnyy Zavod, Autoreparaturwerk
<u>Ruda</u>	Erz
<u>Rudnik</u>	Erzgrube, Erzbergwerk
<u>Rudoupravleniye</u>	Erzgrubenverwaltung
<u>Sel'</u> abbr. Sel'skiy	Land-, Dorf-. In Zusammensetzungen, z.B. Sel'sovet, Dorfsowjet.
<u>Sel'mash</u> abbr. Zavod sel'skokhozyaystvennogo mashinostroyeniya	Fabrik für landwirtschaftlichen Maschinenbau
<u>Serp i Molot</u>	Sichel und Hammer (Sowjetwappen) Häufig vorkommender Name von Fabriken.
<u>Sov</u> abbr. Sovet, Sovetskiy	sowjetisch, Sowjet-. Staats- in Zusammensetzungen

Worte, Aus der sowjet. Wirtschaft

I.

<u>Sovkhoz</u> abbr. Sovetskoye khozyaystvo	Sowjetisches Staatsgut
<u>Sots</u> abbr. Sotsialisticheskii	Sozialistisch, in Zusammensetzungen, z.B. Sotsgorod, Sozialistische Stadt
<u>SSSR</u> abbr. Soyuz Sovetskikh Sotsialisticheskikh Respublik	Union der Sozialistischen Sowjetrepubliken, UdSSR
<u>SSR</u> abbr. Sovetskaya Sotsialisticheskaya Respublika	Sozialistische Sowjetrepublik
<u>shakhta</u>	Kohlenschacht-, grube-, bergwerk
<u>Stal'</u>	Stahl, als Wortendung: Stahlwerk z.B. Azovstal', Azovstahlwerk.
<u>Staryy, Staro</u>	alt, Alt-(wird häufig in Verbindung mit Ortsnamen angewandt)
<u>Severnyy, Severo, Sov</u>	noerdlich, Nord-
<u>Stroy</u>	in Zusammensetzungen: Grossbauvorhaben, im Bau begriffenes Werk, z.B. Dneprostroy, Bau des Dneprkräftwerkes.
<u>Stantsiya</u>	Station, Bahnhof
<u>TETs</u> abbr. TeploelektroTsentral'	Wärmekraftwerk, Heiz- und Wärmekraftwerk
<u>Tsakh</u>	Abteilung eines Werks
<u>Tsentner</u>	Doppelzentner (100 kg)
<u>Tsvetmet</u> abbr. Tsvetnyye Metally	Buntmetalle, NE-Metalle (z.B. Kupfer, Zink, Zinn).
<u>Truba</u>	Rohr, Roehre. Als Werksbezeichnung: "Krasnaya Truba", "Rotes Rohr"
<u>Ugol'</u>	Kohle. Am Wortende bezeichnet es ein Kombinat oder einen Trust der Kohlenindustrie, z.B. "Tulaugol", Kombinat Tulaugol
<u>Ulitsa</u>	Strasse
<u>Univermag</u> abbr. Universal'nyy Magazin	Warenhaus
<u>Upravleniye</u>	Leitung, Verwaltung, Direktion.
<u>Verkhniy, Verkhne-</u>	ober, Ober- (wird häufig in Verbindung mit Orts- und Flussnamen angewandt)
<u>Vodoprovod</u>	Wasserleitung
<u>Vostochnyy, Vostochno-, Vost</u>	Oestlich, Ost-
<u>Vuz</u> abbr. Vyssshaye Uchebnoye Zavedeniye	Hochschule

0 Termin, Ausdrucke und Abdrucke-  
aus der sowjet. Wirtschaft.

I.

V.P.(b) abbr. Vsesoyuznaya  
Kommunisticheskaya Partiya  
(Bolschewiki)

Kommunistische Partei der Sowjet-  
union (Bolschewiki).

VTsIK abbr. Vsesoyuznyy Tsentral'nyy Ispolnitel'nyy Komitet Zentral-Exekutivkomitee der  
Sowjetunion

Yuzhnyy, Yuzhno-, Yuzh

Suedlich, Sued-

Zapadnyy, Zapadno-, Zap

Westlich, West-

0 Zavod

Fabrik, Werk

6. Liste, Ausdrücke und Abkürzungen  
aus der Sowjet. Wirtschaft und Ver-  
waltung.

## II.

ABZ	-	ASFAL'TO-BETONNYY ZAVOD - Asphalt-Betonwerk
BTTO K	-	"BU' TE GOTOV" - soviel wie "Seid bereit" Wehrsportabzeichen ohne Schiessübung
DSR	-	DOROZHNO-STROITEL'NYY RAYON - Wegebaubezirk
DU	-	DOROZHNY UCHASTOK - Wegeabschnitt
I	-	Internirovanny - Internierter
ITK	-	ISPOLNITEL'NAYA TRUDOVAYA KOLONIYA - Schwerarbeit ausführende Kolonie - Strafgefangene
KHOZO	-	KHOZYATSTVENNYY OTDEL - Wirtschaftsabteilung
KEO	-	KVARTIRNO-EKONOMICHESKIY OTDEL - Wohnungs-und ökonomische Abteilung
MKO	-	MEKHANICHESKIY-KONSTRUKTIVNYY OTDEL - Mechanische konstruktive Abteilung
MRP	-	MASHINO-REMONTNYY PUNKT - Maschinen-Reparaturstelle
MTS	-	MASHINO-TRAKTORNAYA STANTSIYA - Maschinen-Traktoren Station
ODP	-	OFITSERNYY DOPOLNITEL'NYY PAYEK - Zusätzliches Tagegeld fuer Offiziere
OCHO	-	OPERATIVNYY CHEREZVUCHAYNYY (CHEKISTSKIY) OTDEL - Operative ausserordentliche (Tscheikisten) Abteilung
OK	-	OZDRAVITEL'NYY KONTINGENT - Genesungskontingent
OK	-	OSLABLENNAYA KOMANDA - Geschwächtes Kommando
OSMU	-	OSOBYI STROITEL'NO-MATERIAL'NYY UCHASTOK - Besonderer Baumaterialabschnitt
PPCh	-	PLANOVO-PROIZVODSTVENNAYA CHAST' - Plan-Fertigungseinheit
PPO	-	PLANOVO-PROIZVODSTVENNYY OTDEL - Plan-Fertigungsabteilung
PTCh	-	PLANOVO-TEKHNICHESKAYA CHAST' - Plan-Technische Einheit
PTO	-	PLANOVO-TEKHNICHESKIY OTDEL - Plan-Technische Abteilung
RO	-	RAYONNYY OTDEL - Bezirksabteilung
SANO	-	SANITARNYY OTDEL - Sanitaetsabteilung
SMU	-	STROITEL'NO-MATERIAL'NYY UCHASTOK - Baumaterialabschnitt

\* / Presumably error for "BGTO" - "Bad' gotov za truda i  
oborony" - "Be ready for labor and defense!": Segal's and  
Mueller's dictionaries give simply "GTO" as the initials for  
both the slogan and the badge - "Ready for labor and defense!"

SU	-	STROITEL'NIY UCHASTOK - Baugrossabschnitt
SIZ	-	STALINGRADSKIY TRAKTORNYY ZAVOD - Stalingrader Traktorenwerk
TO	-	TYUREMYY OTDEL - Gefaengnisabteilung Strafvollzugsabteilung
TO	-	TRANSPORTNYY OTDEL - Transportabteilung
UKS	-	UPRAVLENIYE KUL'T STROYA - Verwaltung fuer das kulturelle Bauwesen
FINO	-	FINANTSOVYY OTDEL - Finanzabteilung
FPL	-	FRONTOPOLEVOY LAGER - Frontfeldlager
V/N	-	VOL'NO NAYEMNYY - "Freier Arbeiter" Dienstverpflichteter
V/P	-	VOYENNOPLENNYY - Kriegsgefangener
VK	-	VSPOMOGATEL'NAYA KOMANDA - Hilfskommando
Z/K	-	ZAKLYUCHENNYY - Strafgefangener

Worte, Ausdrücke und Abkürzungen  
aus der Sowjet. Wirtschaft und Ver-  
waltung.

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Segal's  
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Mueller's

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(over)



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